TOOL DIE MACHINE
PROGRESS
THE NATIONAL TOOL AND DIE JOURNAL

TOOLS, DIES, JIGS, FIXTURES, MOULDS, GAGES, MACHINES
Design and Engineering
PRECISION SPECIALTIES
STAMPING and PARTS PRODUCTION
Official Publication
Special Tool, Die & Machine Shop Industry

DECEMBER,
1937

Circulation more than 10,000

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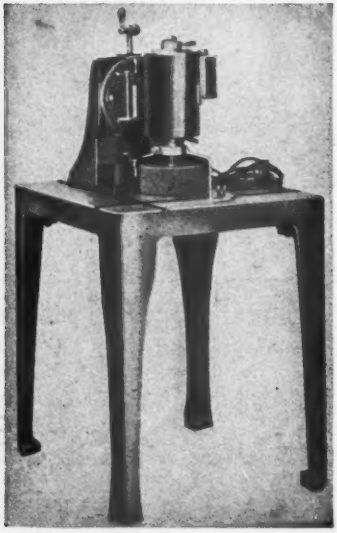

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PROGRESS
THE NATIONAL TOOL AND DIE JOURNAL

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Published in the interest of Manufacturers and Users of
CUSTOM-BUILT TOOLS, DIES, MACHINES AND ACCESSORIES

GEORGE J. HUEBNER . . . *Publisher and Editor*
215 Fairmount-Cedar Bldg. - Cleveland, O.

W. M. Phares, Chicago District Representative, 1 North Crawford Ave., Chicago, Ill.

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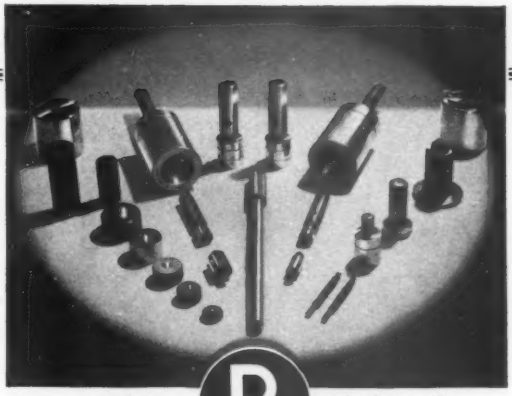

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Greetings

WITH the closing of a year it is a great satisfaction for the members of an organization, both management and workers, to think of it as a successful one—successful, not in terms of dollars alone, but in point of relations with all to whom we have sold our services and our products, as well as with those from whom we have bought materials and supplies.

The workers and management of our firm have enjoyed the privilege of a quite steady volume of work during 1937 and they are grateful for it. In such a turbulent year not all organizations whom we have served have had that experience, therefore our wish for the New Year of 1938 is that Peace shall prevail, and Good Will between all men become ever stronger.

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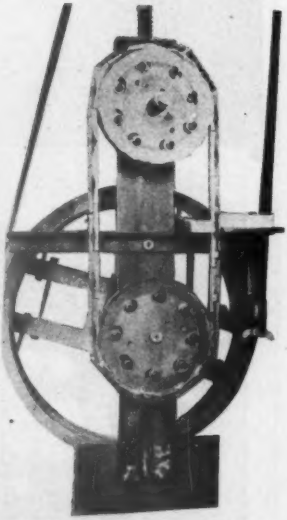

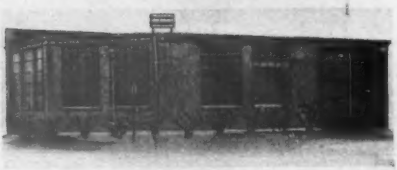

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You are cordially invited to our Exhibit at the International Heating and Ventilating Exposition, Grand Central Palace, New York, January 24 - 28, 1938

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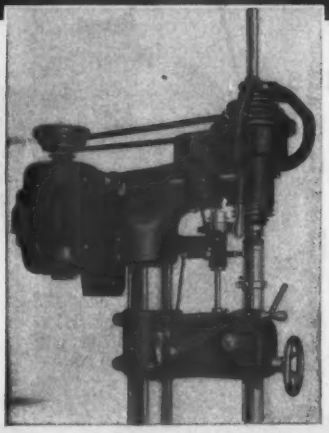

● "I like it because it's so easy to operate — all the levers are within easy reach. It's easy to change from one job to another—The work is better—And my production is up. That 4-point pressure lubrication is a swell idea too. And it drills large holes faster than any drill we've ever had."

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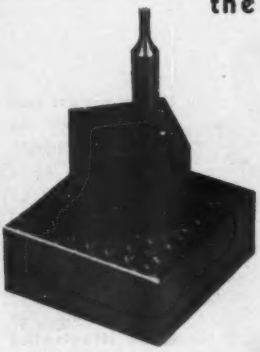
Incorporating the screwlock principle of locking the punch . . . COVERED BY PATENT NO. 2017247



A new series of square hardened steel retainers is presented as an addition to our regular line of punches and retainers. These are made especially

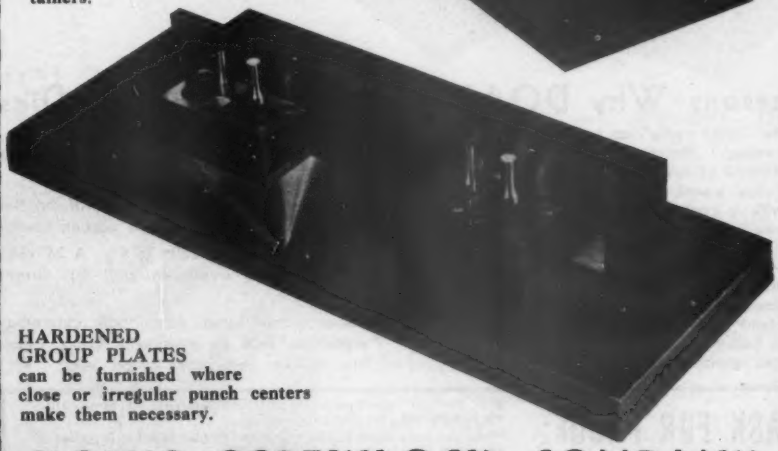
FOR HIGH PRODUCTION AND PROGRESSIVE DIES

Punches used in this series are the same as used in the R-R series retainers.

These new S-R Retainers are made from case hardened steel. The punch hole is ground and lapped. The lock-screw counterbore is ground in the diameter to a close fit to the screwhead diameter, which is also ground. The center distance between the punch hole and the screw head counterbore is held to close limits to properly locate irregularly shaped punches by the screw head.

CLOSE GROUPING of these S-R standard retainers is possible because they are made with the punch close to one corner, which has all the advantages of both the square and end type retainers.

COMPOUND DIES with punches mounted close to the die sections make the use of this design advantageous because they require less room than long narrow end type retainers.



HARDENED GROUP PLATES can be furnished where close or irregular punch centers make them necessary.

HOVIS SCREWLOCK COMPANY

3125 E. LARNED STREET DETROIT, MICHIGAN

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4-WAY TABLE TILT

Saves Die Making Time on DOALL

Draft in dies is readily secured through the 4-way table tilt provided on the DOALL. In many cases this makes possible the use of the slug for the punch, allowing heavy savings in time and material. The DOALL illustrated has 45° forward tilt, 10° back and 10° right and left.

Users report savings as high as 90% from DOALL operation. This precision machine quickly pays for itself even with limited use. With savings estimated only at 50% the model illustrated pays for itself in less than a year with only three hours use per day.

Reasons Why DOALL is Recommended for Dies

1. No "dead cycle" as in "jig saw" or hand sawing. Hence, 100% cutting efficiency instead of intermittent 25% cutting.
2. Entire length of the saw is used, while with a hack saw or reciprocating machine you use only the middle area of the saws.
3. No "drag back" to dull the cutting edge of the saws. It is well known that the drag on the back stroke dulls the files and saws quickest.
4. Steady flow of cutting provides for ease in following a line, simplicity in operation and greater efficiency.
5. The Doall combines, in one machine, various widths of saws, files and polishing bands.
6. The metal cutting band saws will cut the toughest high chrome, high carbon steels.
7. Work thickness capacity is 8". A 24"x34" work table is available with 30" throat depth.
8. These same band saws will cut other materials, such as aluminum, brass, bakelite, rubber, cork, hard wood, etc.

ASK FOR PROOF: *Our factory representative will demonstrate in your plant on your work, no obligation.*
Send for new work book, "25 Ways to Cut Machining Costs," showing how users save with Doall.

CONTINENTAL MACHINE SPECIALTIES, INC.
1301 WASHINGTON AVENUE S. MINNEAPOLIS, MINNESOTA

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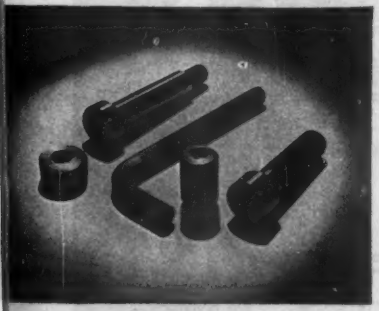
No. 22
5 x 2¾ x ⅝
List Price $1.00

No. 33
6¾ x 4½ x ¾
List Price $1.25

HOLO-KROME
"the FIBRO FORGED Socket Screw People"



Time Savers — Always Handy

Equip your mechanics with one of these sets: No. 22 contains 9 wrenches — No. 33, 11 wrenches. Packed in sturdily made black crackle finish heavy gauge metal boxes. The Holo-Krome "File Hard" Wrenches fit all standard makes of hexagonal shape sockets — Set, Cap, Stripper Bolt and Pipe Plugs — in the sizes as shown on the box labels. Nos. 22 and 33 fit any tool box. Handy pocket size for carrying on the job. Act Today!

Stocked by all Holo-Krome Distributors

THE HOLO-KROME SCREW CORP., Hartford, Conn., U.S.A.

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THE
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J. J. KOHL
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ITCO
PRODUCTS
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A THOUGHT

Some time ago a parts manufacturer bought ONE die to make a certain new part. The price paid therefor was in the neighborhood of *$750.00*. We were privileged to see this die shortly thereafter. It had cracked in two, and failed to produce parts anywhere close to specifications.—Consequence—a patched set-up—delayed and interrupted production, three extra operations to correct deficiencies—excessive manufacturing costs and last, but not least, very serious customer dissatisfaction.

Available information does not reveal the final outcome of this situation, but a contrast is furnished by the following:

At this same time another plant had this identical part to make. Collaborating tool engineers and production men decided to make the part in two operations after preliminary lay-outs and studies. In the die designing, every element and feature of strength, interchangeability, maintenance economy, operating efficiency including the application of self-contained Hydraulic clamping arrangements and accuracy was carefully analyzed and considered. The designing cost was *$267.00*. The building of the two dies cost *$5,017.00*. Actual production was started within 24 hours after delivery, only normal adjustments being necessary. This was in November, 1934. Recently, this set-up was reported still in daily production, having required only normal maintenance during the elapsed 3 years.

An unusual case? — Extreme? —

— Perhaps —

Yet similar cases reveal themselves continually —different only in degree and detail, but furnishing much food for thought.

NOTE—There will appear on these pages, from time to time, various "Thoughts" pertinent to business in general and the Tool and Die Industry in particular. We invite comment.

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and
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Adjustable While Running!

The Precision Universal Tool Head

is faster, more accurate, and more economical!

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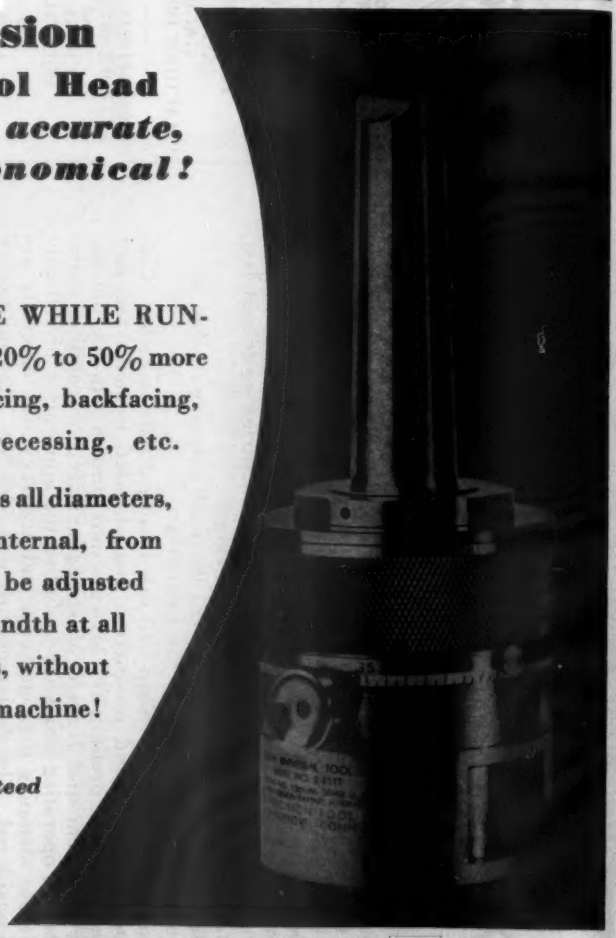
Being "ADJUSTABLE WHILE RUNNING," it saves from 20% to 50% more time while boring, facing, backfacing, turning, trepanning, recessing, etc.

One compact size handles all diameters, both external and internal, from 1/16″ to 16″, and can be adjusted to a fraction of a thousandth at all times, and at all speeds, without stopping either tool or machine!

Unconditionally guaranteed for one year!



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THE PRECISION TOOL COMPANY

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Tool • Die • Machine **PROGRESS**

The National Tool and Die Journal

December, 1937 **Vol. 3, No. 9**

MY WISH FOR EVERY MAN

Words that have lived through the years, words which every man should reflect upon this year particularly, express my Christmas sentiment and New Year Wish.

GEORGE J. HUEBNER, *Editor*

"This above all: to thine own self be true,
And it must follow, as the night the day
Thou canst not then be false to any man."

William Shakespeare

"Nothing but harmony, honesty, industry and frugality are necessary to make us a great and happy people."

George Washington

"Glory to God in the highest, and on earth peace, good will toward men."

St. Luke

Lamination Die Makes Modern Electric Motor Production Possible

By WM. P. STEIN, President
Wm. P. Stein & Company, Rochester, N. Y.

For thirty-five years Wm. P. Stein & Company have been building sheet metal dies and precision specialties. For twenty-five of those years the sectional progressive lamination die has been in process of development. This type of die is an important contribution to high production manufacture.—The Editor.

IT IS probably safe to say that of all the different types of Special Tools, Dies and Machines which are built in the TDM Contract Shops of the country, none require greater accuracy in building than the lamination die.

Designed and built to produce millions of blanks for the armature and field cores of motors, generators, starters and transformers, the modern lamination die is required to have an unusually long trouble-free life as well as to be practically automatic in its operation. High speed presses, geared to as many as 250 strokes per minute, are regularly found in the electric motor manufacturing plants of this country and Canada. A die, to withstand such production requirements, must be the last word in precision and accuracy from the die maker's standpoint.

All cutting parts of these lamination dies are sectionally made of high carbon, high chrome alloy steel. They are ground all around to size and fit after hardening. This constitutes one of the most important operations. Sectional construction permits replacement of any chipped or broken parts of a punch or die with very little delay thus avoiding the possibility of a costly shutdown when production requirements may be the most urgent, likewise at a minimum of cost. Such sectional die construction, although more expensive at the outset, definitely prolongs the "life" of a die, and by virtue of its greater parts production is a far less expensive tool to use.

In the building of lamination dies quality must be the paramount factor. Only proven materials and parts can be considered and workmanship must be of the highest order. With accuracy as the

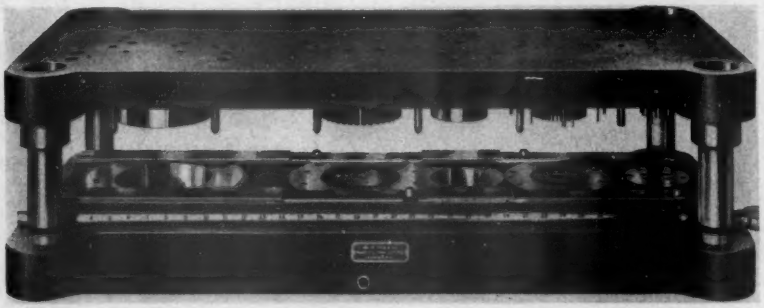

Fig. 1. A Stein five station progressive electric motor lamination die. This die produced a complete rotor lamination and a complete stator lamination with each stroke of the press. The rotor is about 3¼" in diameter, has 44 wiring slots, 6 ventilation holes and shaft hole with key. The stator is 5½" in diameter, has 36 wiring slots and 8 rivet holes. Note that the rotor results from using what would otherwise be scrap—the center of the stator.

password, personnel must be highly experienced and equipment unquestionably certain in its operation. Designing and engineering, of course, play important parts, also.

Stein Lamination Dies will produce millions of blanks of uniform accuracy. The numerous wiring slots in motor parts stampings must be equally spaced with a tolerance of not more than plus or minus .0001 inch and they must be absolutely concentric with both inside and outside diameters.

The assembled die herewith illustrated is a five-station progressive die made to produce a complete rotor lamination and complete stator lamination at each stroke of the press. The rotor is about 3¼ inches in diameter and has 44 wiring slots, 6 ventilation holes and shaft hole with key. The stator is about 5½ inches in diameter and has 36 wiring slots and 8 rivet holes. The rotor is produced from the center of the stator scrap, thus saving considerable material. Finished blanks are taken from under the press, all stacked and ready for assembly. They are placed on the assembly line with only one or two handlings, all sorting and stacking being done automatically.

Lamination blanks are made from thin metal, very seldom over .025 inch thick and sometimes as thin as .007 inch. To produce blanks free of burrs from such thin metal, it is necessary that the clearance between punch and die be very accurate and absolutely uniform. If clearance is not accurate and uniform it would be impossible to obtain the high production demanded of these dies.

The designing of these sectional lamination dies has been a series of experiments and improvements over the course of 25 years. Their present stage of development has been reached step by step; each small item tried and proven and constantly improved. The methods of fitting and assembling the sectional parts and the equipment required are highly specialized.

An illustration of the value of the Stein type of sectional lamination die construction and the high degree of economy which results from dies so built, is apparent from the following

(Continued on page 37)

Fig. 2. A compound lamination die showing parts disassembled and samples of the motor parts it produces. Note the sectional construction of the die and the numerous parts ground and lapped to fit perfectly. Note also the extra punches which are easily replaced in the event of breakage.

The Advantages of Turret Lathes in Tool and Die Shops

By HENRIK KYLIN
Bardons & Oliver, Inc.
Cleveland, Ohio

THE majority of the lathe work in tool and die shops is done in small lots and is of such a nature that it requires a high degree of accuracy. A machine that will carry all of the necessary tools at one time and duplicate all diameters and lengths accurately will prove a great saving over a machine that carries only single tools and is without means to duplicate lengths and diameters. The machine should also be flexible enough to be quickly changed for the gripping of castings and for the feeding and gripping of a bar. The turret lathe is usually thought of in the sense of being a machine used for semi-high and high production work of a certain nature, however it can be used to great advantage on small lot production as well.

Analysis of the work will readily disclose the extreme importance of the adaptability of the machine to hold work by many different methods. Pieces may be made from steel of most any size from a small fraction of an inch to several inches in diameter. Castings of regular and odd sizes and shapes are encountered as well. Bar work can be held in the automatic chuck and fed by the lever operated bar feed. This eliminates all necessity of cutting pieces from a bar, centering them, holding them between centers and driving by means of a lathe dog. By holding with the automatic chuck behind the work oftentimes the entire piece can be machined at one chucking, with the possible simple exception of facing the end cut off. For this second operation the piece would again be held in the automatic chuck. Bars of any size up to the capacity of the machine can be gripped by changing collets or collet pads as the case may be with the particular machine.

By removing a few screws the automatic chuck is removed and a Scroll chuck or face plate may be installed. No centering of the chuck is necessary because of a standard tapered pilot diameter on the flange of the spindle. The jaws for the chuck can be accommodated for odd as well as regular shapes. Many pieces having diameters that are eccentric with a hole, can be gripped accurately by special jaws. When it is desired to use bar steel larger than the capacity of the bar feed of the particular machine, the bar can be cut to suitable lengths by a power saw. The individual pieces can then be held in a chuck and machined much the same as a casting.

The carriage apron and saddle apron deliver a wide variety of power feeds to the cross slide and carriage and turret slide. Six tool carrying positions, each provided with an independent adjustable

Fig. 1

Turret Lathe tooling such as might economically be used on small lot production of pieces made from bar stock.

stop are provided on the turret. For bar work, drills, boring bars, reamers, tap and die holders and turning tools may be held. For larger pieces that must be held in a chuck, tools may be provided for turning larger diameters from the turret. Different tool or tool holder positions allow a wide variation in the diameters that can be turned. To add rigidity an overhead pilot for many of these tools may be used. Different arrangements are possible for carrying the tools on the cross slide. The square turret located on the front of the cross slide will carry four tools. Indexing from station to station is accomplished by a simple motion of the lever on top. The return motion automatically clamps the turret in position. If more than four tools are needed a tool post holding a single tool or a block holding a number of tools may be provided for the rear of the cross slide. If desired, the square turret may be removed and a tool block used in its place. Adjustable stops are provided for the carriage longitudinal motion. For duplicating diameters a large micrometer dial equipped with clips is placed directly behind the cross feed hand-wheel. For facing cuts the cross feed may be disengaged by an adjustable block. Threads may be cut by one of three methods. The turret can be used to hold a tap or die holder and is then fed by hand up to a pre-set stop. Threads can also be chased from the cross slide. One method is to use a screw cutting attachment of the leader and follower type attached to the carriage apron. The other method is to employ a variable geared head end bracket and a lead screw. This lead screw is cut as part of the feed shaft. Tapers may be turned by the addition of the taper attachment fastened to the rear of the cross slide and anchored to the bed.

Another tool which proves very useful for short run work of a widely varying nature is the compound tool slide mounted on the front side of the cross slide. The tool may be set and fed by hand to cut at any given angle.

All of the tools used can be very easily installed and adjusted to the work. Turning tools held on the turret are provided with rollers, the slides for which are fitted with adjusting screws. The tool slide on the single cutter turner also has a screw for adjustment. The tool holders used in the multiple turning head have collar head screws to provide a backing as well as an adjustment for the cutting tool. By turning the screw the tool is moved forward. Boring tools may be set and tightened in their position in the boring bar. However, a much more convenient method, especially when holes of different size on different jobs are encountered, is to use a standard boring bar in a vertical slide tool. This tool has a vertical slide the motion of which will change the diameter of the cut. The slide is set to bore a certain diameter and clamped in place. If the next job done has a hole of a different diameter the slide may be set for the new position very easily. Internal facing is done with this tool. The turret slide is moved forward to the stop and clamped in place. Facing is then done by moving the vertical slide which is provided with stops.

A visit to a tool shop disclosed a typical job showing the advantages of the turret lathe over the engine lathe for certain types of work. The particular piece noted was approximately 6" in length. There were two outside diame-

(Continued on page 22)

Fig. 2
A close-up of tools showing some that might be used in machining castings. With the turning head as shown, different diameters can be machined at one time.

(Continued from page 21)

ters the larger of which was knurled, and two inside diameters, one of which was threaded. To perform this job a bar was held in the automatic chuck of the machine and moved forward by the bar feeding unit. The tools in the turret consisted of a stop, against which the bar was fed a pre-determined length, two drills, and a releasing tap holder. The square turret held the necessary tools for turning the two outside diameters, knurling the one diameter and chamfering the other. The cutting off tool was held in the rear tool post. When the first piece was made the stops for the turret stations and the longitudinal carriage positions were set to disengage the feeds at the proper time. Four tools were held in the turret and four on the cross slide. Time was saved over previous methods in making the first piece in spite of the fact that the tools and stops had to be set. The time needed to make the additional pieces was only the actual machining time plus the time to index the tools into position for each subsequent cut. This case was by no means an exceptional one in the saving of time. If more tools had been needed on the turret a further comparative reduction in time would have been noted. It is common practice on work of a more complicated nature to finish two or more diameters at the same setting of the turret or cross slide tools.

The above photographs show some of the tools that might be used for small lot production as well as higher production. The tools shown mounted on the turret in Figure 1 consist of a drill, a boring and recessing tool, a reamer, a single cutter turner, and a multiple cutter turner. By using either of the two turning tools shown, the outside diameter of a bar can be cut from the turret. Roller back rests are provided to steady the work. With the multiple cutter turner two or more diameters can be turned at one setting. The square turret tooling consists of those that might be used for facing, grooving, or turning. A cutting off tool is held in the rear tool post. Figure 2 shows some of the tools that might be used for work of a larger nature. As shown, different diameters can very easily be machined at one setting of the turning heads. The overhead pilot adds rigidity by actually connecting the turret to the head stock of the machine.

None of the features found in the individual makes of turret lathes such as the automatic clamping of the turret, the automatic braking of the spindle, and the wide range of speeds and feeds available have been mentioned.

The main advantages of using turret lathes for the wide variety of work such as is found in tool and die shops can easily be summed up. The machine is very adaptable to work that must be held in a bar chuck or a scroll chuck. The turret is capable of carrying six tools, each with a power feed and an adjustable stop. The cross slide is able to carry four tools in the square turret and a number of tools by some suitable means on the rear of the slide. Both longitudinal and cross motion may be power fed and coupled with adjustable stops and means of duplicating diameters. In addition to the standard units, such features as the thread cutting attachment, the taper turning attachment, and the compound tool slide may be used.

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DANLY DIE MAKERS' SUPPLIES

Die Designing and Estimating

By CHARLES BOHMER

In the November issue, under the title "Die Estimating," appeared the introduction to this series on tool and die estimating. This first article begins with die designs and particularly describes piercing dies and their component parts. The author, Charles Bohmer, sales engineer of Brust Tool Manufacturing Company, is one of the instructors of the class in Die Designing and Estimating now being conducted under the auspices of the Chicago District of the Special Tool, Die & Machine Shop Institute in the Carl Schurz High School.

Part I

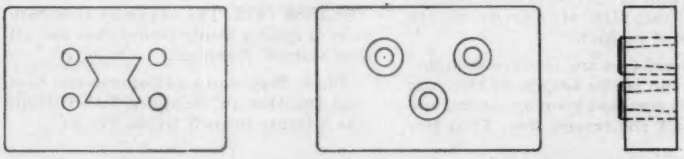
PIERCING DIES

The purpose of a piercing die is to perforate holes of a definite size and contour in material of a chosen character. Its construction is wholly dependent on factors such as accuracy, type of perforations, thickness or quality of material to be pierced, quantity of parts to be made, etc. The piercing die plays an important part in production, and therefore must be designed and made to perform the desired operation as efficiently as is possible. Before this can be done each important detail must be thoroughly understood to determine its practicability.

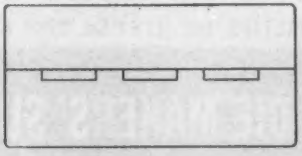
The following descriptions and illustrations of the component parts of a piercing die are of the most widely used types of construction and their adoption to particular phases of piercing operations. However, although a particular type of construction may be best suited for an operation, that particular construction may be too expensive for the purpose, and therefore should not be used. The choice of the proper type is a responsibility that very often rests entirely upon the shoulders of the designer and we hope that the ideas contained herein will help to make this choice an easier matter.

The important parts of a piercing die are the die block, the punches or perforators, the punch pad or retainer, the stripper and the gauges, all of which are mounted on a die set.

DIE BLOCKS



A B



C

DIE BLOCKS

A—TOOL STEEL DIE BLOCK.

(1)—Tool steel block with openings machined accurately as to location, size and contour.

(2)—Used when holes are too close together or of a very complicated shape that would make the insertion of bushings impossible.

(3)—Precaution must be taken to maintain accuracy. Because of change or warpage in hardening, openings should be ground.

(4)—A less expensive construction in some cases because it eliminates the making of bushings. Adaptable when the part is small or when close tolerance is not needed. Not usually recommended in larger sizes as the cost of steel may enter as a prohibitive factor.

B—SOFT DIE BLOCK WITH INSERTED HARDENED TOOL STEEL BUSHINGS.

(1)—A soft block of machine steel or cold rolled steel with holes bored in the proper location and hardened bushings with the openings in them, inserted into the holes. The block remains soft thereby eliminating the danger of inaccuracy due to warpage.

(2)—Makes lining up or assembling easier for both die and punch pad; can be bored at the same time without danger of change due to hardening, and for that reason is practical where extreme accuracy is required.

(3)—Soft block makes the mounting of gauges a simple and accurate procedure.

C—SECTIONAL DIE BLOCK.

(1)—Several tool steel sections with openings machined in such a way that when assembled they will have the proper size, contour and location.

(2)—A great time saver where there are a great number of square or rectangular shaped openings.

(3)—Simplifies the matter of machining difficult openings while maintaining the necessary precision, particularly where the openings are so small that no practical tool can be used to work them out to the desired shape.

(Continued on page 38)

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Development of the Grob Filing Machine

By THEODORE GROB, Co-Partner
Grob Brothers

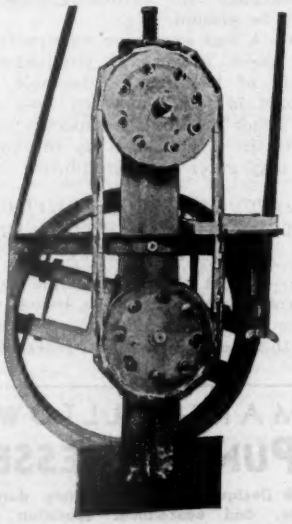
Continuous filing and sawing machines in their present state of development, although comparatively new, are proving eminently successful. Stories of success, be they of product, firm or individual, are always of interest. Last month we allotted space to one manufacturer for a description of his machines; herewith we extend the same opportunity to another.—The Editor.

TO start your own business is like jumping into cold water. You have to swim and work hard, but things are happening and you are going places. When early in 1929 we hung out our shingle, "Grob Bros. Tools & Dies," well-meaning friends, relatives and neighbors shook their heads and gave us to understand that things would go bad with us; that we should have kept our jobs. We even received letters, in particular one telling us: "Success with your equipment is impossible." Our equipment, I must admit, consisted of a two-car garage, an old lathe, a drill press and a few miscellaneous tools. However, with unlimited confidence, we bought some much needed new machine tools and set to work.

The same year, that is in the fall of 1929, we built a neat machine shop and moved from our then over-crowded garage. We still made tools and dies, but found that the filing of dies, punches, stripper plates and other parts was slow and tedious. At that time the only filing machines available were of the reciprocating type.

To make "both ends meet" we often worked past midnight and it was while filing for hours at the same job on a reciprocating machine that we had the idea of fastening files to a chain and doing continuous filing. The immediate result was the experimental machine illustrated, built in February, 1930. This was a crude outfit and the pulleys, being of octagon shape, sounded like a machine gun when operated. However, it convinced us of the possibilities of continuous filing.

When making U.S. patent application, we were confident of obtaining basic protection, but to our surprise we learned that a number of previous attempts had been made, and that the patents of the basic idea, that is, of the continuous filing motion, had run out for some time.

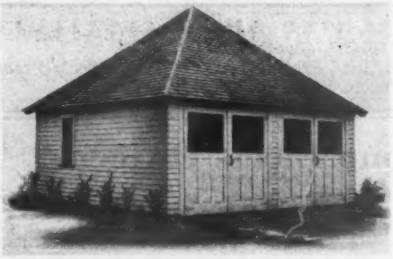


First Experimental Continuous Filing Machine.

It was our good luck not to have known of these earlier attempts for the difficulties to be overcome in obtaining smooth, clean cutting action were tremendous, and, had we known that others tried it before us, we may well have given up hope and would have kept on making tools and dies.

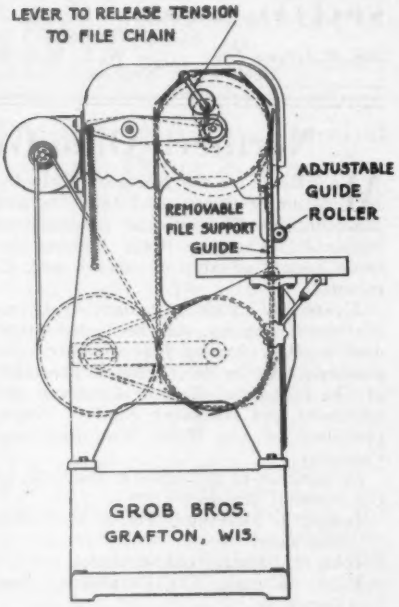
But, by that time, on account of a number of important improvements, our machine was successful. Some of the entirely new features are as follows:

1. The Grob machine is the first machine having a full removable work support fastened from the frame above and passing through the table. Without such a support continuous filing cannot be successful.



Started Business in 1929

2. It is the first machine using files having overlapping and interlocking ends. Without such files, smooth, clean cutting cannot be attained.
3. It is further the first machine wherein the chain has but slight tension and is driven positively, and wherein the files and chain are guided securely by passing through a U-shaped file support being smaller in width than the width of the files and guided in front with a roller, thereby insuring the desired smooth cutting action.



Latest Grob Filing Machine.

Above features as well as various others are patented by U.S. Patent Numbers 1958477 and U.S. Re. 19999 or have patents pending.

Due to these improvements, smooth and accurate continuous filing has been made possible. The construction of the Grob file-carrier is such that no amount of chips that may find their way behind the files will harm the smooth cutting action in any way.

Occasionally the question comes up: "Why build single purpose machines? Why do you not incorporate a saw blade in your filing machine?" There are various reasons, but the most important is that certain very desirable features have to be sacrificed if double purposes have to be incorporated. Each machine must serve a specific purpose, and while there is more than one way to kill a cat, some ways are better than others. What I'm driving at is that a certain tool meant to do a certain job can be built simpler, cheaper and more to the point if it has to do but one job.

(Concluded on page 41)

SPECIAL TOOL, DIE & MACHINE SHOP INSTITUTE
NORTHERN OHIO DIVISION, *Cleveland, Ohio*
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Meets every Wednesday for luncheon, 12:15 P.M., Allerton Hotel

Northern Ohio Group Elects Officers

MEMBERS of the Northern Ohio Division of the Special Tool, Die and Machine Shop Institute met for luncheon December 15 at the Hotel Allerton for their annual election of officers and directors.

Joseph H. Lyons, president of Lyons Machine Company, was re-elected president for the ensuing year as were vice-president Harley L. Freeman, president of The Industrial Machine Company and secretary and treasurer Emil P. Hahn, president of the Hahn Manufacturing Company.

In addition to the officers, members of the board of directors are:

Joseph J. Federkiel, The J. C. Ulmer Company.
John H. Salzer, Tools & Gages, Inc.
F. A. Schmalz, The Paramount Tool Company.
A. L. Sommer, The Sommer & Adams Company.

The membership committee appointed by the president consists of:

Chairman—F. C. McKinney, The McKinney Tool & Mfg. Co.
E. B. Bunell—The Bunell Machine & Tool Co.
J. C. Schurger—Star Machine & Tool Co.

Appointed to the entertainment committee:

Chairman—J. R. Fitzsimmons, Danly Machine Specialties, Inc.
T. A. Barth, Barth Stamping & Machine Works.
F. W. Denning, The Denning Mfg. Co.
W. L. Warrander, Tools & Gages, Inc.

It was the concensus of opinion of the members present that the year as a whole had been a very satisfactory one for Cleveland district members. The year shows for most shops in the district a larger volume of sales and although wages paid were higher than at any previous time buyers proved their willingness to pay reasonable prices for a high grade of work. Current operations are still satisfactory for most shops and for some there is already evidence of new business which will carry well into 1938.

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Two Interesting Meetings of Southern Ohio Group

THE Tool Manufacturers' Association, Southern Ohio group of the Special Tool, Die and Machine Shop Institute, held its November meeting in the Green Room of the Van Cleve Hotel, Friday evening, November 26, 1937. After dinner Wayne G. Lee, Managing Director, Dayton Chamber of Commerce, was introduced as the speaker. His subject, "The Legislative Trend in Washington," was unusually well handled and very timely. Mr. Lee had a short time previously returned from Washington where he had an opportunity to learn facts and observe conditions at first hand.

On December 17th, the same group was addressed by Judge George J. Tenesy, Chief of the Legal Department, Unemployment Compensation Commission of the State of Ohio. Judge Tenesy's subject was "The Ohio State Unemployment Tax Act," a piece of legislation of vital importance to all Ohio business men. The attendance was unusually large because of this fact.

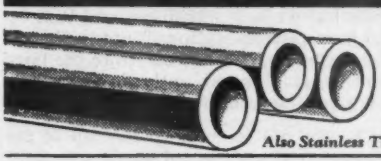
Planning Members' Annual Dinner Dance in January

The Tool Manufacturers' Association of Southern Ohio is planning its principal social event of the year which will be a dinner dance in the ballroom of the Miami Hotel, Dayton, Ohio, Saturday evening, January 29, 1938. Judging from comments and reservations, Secretary H. L. Neilson predicts that the attendance will exceed that of all previous similar events.

DURING the last fifty years science and invention have led us farther and farther from the world that was; deeper and deeper into a new environment. . . . We may confidently depend on science to provide the foundation for a better social structure, if we can prevail upon ourselves to build thereon in a different frame of mind.

ARTHUR D. LITTLE

OIL HARDENING TOOL STEEL TUBING



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CHICAGOLAND

Reported by WILLIAM M. PHARES, *Secretary*, Chicago Division
KARL HARIG, *President* E. W. FRITZELL, *Vice President* CARL DANIELSON, *Treasurer*

Annual Autumn Dinner Dance A Huge Success

ASIDE from the relaxation and enjoyment which any social event may bring to a "tired business man," there are unusual benefits when the gathering is one of executives and department heads of firms which regularly compete for business. Regardless of the intensity of striving for contracts during the day, the very surroundings and atmosphere of a party promote good will and recognition of interests which all have in common.

The members of the Chicago Division of the Special Tool, Die and Machine Shop Institute are firm believers in this policy and for a number of years have gathered for an Annual Autumn Dinner Dance. This year the attendance of members of the Institute and their guests was larger than ever before—a total of 438. Not only were the home folks all there but guests came from Indiana, Iowa, Wisconsin, Michigan and Ohio.

Hors-D'oeuvres and cocktails were served at 6:30 before the formal dinner in the Bal Tabarin of Hotel Sherman. This provides an ideal place for such a gathering although in this instance the party overflowed into the adjoining lounge.

The dinner was a typical Thanksgiving menu, unusually well served. The dessert and its serving were a novelty. With the darkening of the salon the waiters appeared each carrying an artistically colored frozen pudding illuminated from underneath. Excellent music for dancing continued during the dinner and with its completion a master of ceremonies took charge. The floor show which followed was comparable to the program of a first-run vaudeville theatre and certainly surpassed that of most night clubs. Another novelty which the Bal Tabarin introduced is the illusion of changing scenes and surroundings. First one imagines himself on Chicago's busy thorofares with the magnificent lakefront in view, an effect made possible by photographic projection of the skyline upon the walls. From Chicago one is transported in fancy to Florida, California, Hawaii, and the South Seas. Natural colors make the breaking surf and the waving palms very realistic indeed.

The entertainment committee of the Chicago district is to be congratulated upon the marked success of the party. The committee consists of Miles Irmis, Chairman, Harry Appel, Karl Harig, Rudolph Krasberg and William Phares.

One of the highlights of the Chicago party was the announcement that Miles Irmis, veteran member of the TDM Industry, and one of Chicago's most eligible bachelors, had been married on Saturday morning a few hours before the party. The information did not come from Miles Irmis but when it was discovered that he had surreptitiously slipped into the bonds of matrimony he was escorted to the microphone amid great enthusiasm to tell how it all happened.

Chicago did its best to live up to its reputation of unexpected windstorms and blizzards. Mr. and Mrs. George J. Huebner driving from Cleveland to attend the party drove into a blizzard of no small proportions as they approached the city.

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Round Table Discussion Proves An Interesting Point

AN interesting meeting of the Chicago District members was held on Thursday, November 18. The specific purpose of the meeting was to discuss the business recession which was coming into evidence at that time.

The procedure was for each member to report on conditions as to his own business: work in process, contracts on hand and in sight. After everyone had reported it was unanimously agreed that there was no cause for "panic," in fact the round table discussion brought out the fact that a temporary respite could have its good points. For months demands for special tooling equipment of all kinds have been so continuous that men are in need of a period of recreation and machines of maintenance and adjustment.

It was pointed out that the slackening of pace could be of distinct advantage to production manufacturers in need of tools, dies, machines and the numerous other precision products made in TDM Industry shops. Precision products never lend themselves to economical construction when workers are under pressure.

Chicago Dealer Stages Unusual Machine Tool and Equipment Show

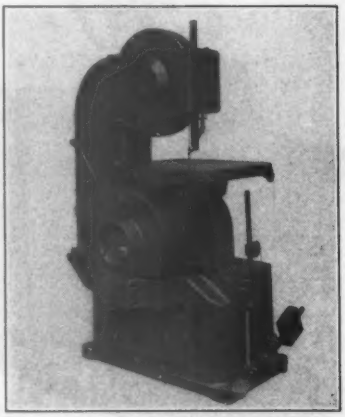
ON January 18th and 19th, Neff-Kohlbusch & Bissell will exhibit Tool Room, Die Shop and Production Equipment at the modern plant of the Service Tool & Die Manufacturing Company, 4625 Fulton Street, Chicago, Illinois.

A complete line of machinery will be shown including Jig Borers, Radial Drills, Shapers, Lathes, Milling Machines, Surface Grinders, Production Millers, Plastic Injection Molding Machines, Gear Grinders, Gear Testing Equipment, Portable Spot Welders, Table Type Welders and many others.

Twenty-seven machines will be under power and will be demonstrated under actual working conditions.

Members of the TDM Industry are cordially invited to visit the exhibit.

Grob
Open End Bandsaw
Model OS-20



The only METAL BANDSAW requiring NO brazing or welding; set-up time 20 seconds.

Positive drive insures maximum feeding pressure with greatest cutting speed. Furnished with 20" or 36" throat. Power Feed. Compound table.

Originated by GROB BROTHERS who also developed the continuous type chain filing machine for internal and external work—see pages 9, 28-29.

BRETT MACHINERY CO.

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phones Van Buren 7878-7879

EXCLUSIVE CHICAGO REPRESENTATIVES

also for:

MOORE Jig Borers
HAMILTON Tool Tables (see page 30)
MAGNA-SINE Magnetic Sine Tables (see page 30)
DETROIT Power Screwdrivers
MULTEPLEX Wire Formers
HAMILTON Rotary Files (see page 32)

When you order or write about products described in TDM PROGRESS please mention the publication.

Hydraulic Tub Beading Machine

THIS machine has been developed primarily to perform various types of beading operations on metal tubs.

The tub is inverted, placed on the table with one side between the rolls which rotate and revolve it to form the bead into the side wall. The bead may be almost any shape and size and when fully formed the rolls automatically withdraw, permitting removal of the tub.

The entire machine is hydraulically controlled, giving a smooth but powerful action. Adjustments are so located that the operator can make set-up changes easily and with little loss of time. The operating controls permit a free and natural posture for the operator, thus materially assisting in maintaining production. The machine is a portable unit which can be moved readily and thus obviates the necessity for moving large quantities of bulky products.

For more detailed information write The McKinney Tool and Manufacturing Company, 1688 Arabella Road, Cleveland, Ohio.

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New Crankshaft Adapts Power Press to Modern Production

EMPCO *Heat Treated* Crankshafts are a recent development of the Enterprise Machine Parts Corporation intended particularly to adapt power presses to heavier work and higher speeds than they were originally designed for.

Made of Empco alloy steel forgings, especially heat treated to insure extreme toughness, resiliency and the remotest possibility of crystallization, these crankshafts replace the most vulnerable part of a press.

Manufacturing processes measured by today's high production standards are subject to continual change and improvement. But more than that, new models and new designs definitely call for equipment changes. –

Automatic machines are sufficiently versatile to be adapted to new products fabrication with the minimum of such changes. The Enterprise Machine Parts Corporation for more than 20 years has specialized in the redesigning and rebuilding of such equipment. Recently the volume of such work has necessitated a substantial addition to the Enterprise plant, as well as the installation of several new machine tools. A stock of parts for the repair of standard production machines is also maintained.

Huber Now Ex-Cell-O President

At a meeting of the board of directors of the Ex-Cell-O Corporation held on November 23, 1937, Phil Huber, vice president and assistant general manager, and one of the original organizers of the company, was elected president and general manager to succeed N. A. Woodworth. H. G. Bixby, who has been assistant secretary since 1929 and comptroller since 1932, was elected secretary and treasurer of the corporation as well as a director.

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GROBET FILE CORP. OF AMERICA
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New Plant for Ajax Steel & Forge Co.

AJAX Steel and Forge Company has acquired a new plant at 205 Adair Street, Detroit, Michigan. The building is admirably suited for the making of forgings and has been equipped with thoroughly modern facilities. The plant layout provides for the receiving of raw materials at one end and their progressive fabrication until they emerge at the other end of the plant as finished forgings.

There is an unusually large billet storage and the plant arrangement does not necessitate back-tracking or unnecessary handling. The building is extremely long and wide which makes for excellent ventilation and it is equipped with overhead traveling cranes of large capacity.

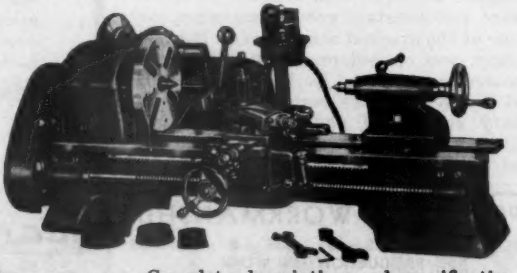
A 1,000-ton hydraulic forging press, which is said to be the largest between Pittsburgh and Chicago, has been installed. This press has a mechanical manipulator which obviates the necessity for considerable hand labor. A complete battery of new forged heating furnaces with substantially increased capacity have been installed. Automatic controls and efficient pyrometer equipment assure uniformity of billet heating. A power house with two 300 HP tubular boilers provides a surplus of steam power.

An electric butt welding department has been installed adjacent to the main forge shop and is adequate to take care of the continually increasing volume of welding made necessary by the demand for Ajax composite die sections.

Atlas New Small Lathe Has Large Machine Tool Features

THE new small precision lathe recently announced by Atlas Press Company, Kalamazoo, Michigan, actually has the features of the larger machine tool scaled down for accuracy and efficiency on small work.

This new back-geared screw-cutting lathe is particularly adapted to small-part machining. It swings diameters up to 6 inches and is available in bed lengths having 12 inches and 18 inches capacity between centers. Included among the details of modern construction of these new Atlas Lathes: reversible power feeds for carriage; complete V-belt drive; Timken tapered roller spindle bearings; integral countershaft; 16 speeds; careful provision for maintaining permanent accuracy. Thread-cutting range is 8 to 96 threads per inch, right or left hand.



Complete description and specification are given in Atlas General Catalog No. 28 TD which will be mailed without charge upon request.

When you order or write about products described in TDM PROGRESS please mention the publication.

Lamination Dies

(Continued from page 19)

illustration. A five station die in use by an electric motor manufacturer had been reground for the twenty-seventh time. The depth of each cut was according to the following enumeration:

	DIE	PUNCH
NEW	1.475"	2.624"
1st Grinding	.005"	.010"
2nd "	.011"	.011"
3rd "	.010"	.010"
4th "	.010"	.009"
5th "	.011"	.009"
6th "	.010"	.025"
7th "	.012"	.031"
8th "	.011"	.012"
9th "	.012"	.017"
10th "	.010"	.008"
11th "	.013"	.014"
12th "	.012"	.011"
13th "	.011"	.028"
14th "	.010"	.011"
15th "	.009"	.016"
16th "	.009"	.016"
17th "	.008"	.013"
18th "	.011"	.009"
19th "	.007"	.016"
20th "	.008"	.010"
21st "	.012"	.010"
22nd "	.012"	.020"
23rd "	.012"	.010"
24th "	.007"	.014"
25th "	.010"	.016"
26th "	.008"	.011"
27th "	.011"	.015"
	.272"	.382"

After the twenty-seventh grinding the die had produced a total of 4,629,200 sets of rotor and stator blanks, an average of 171,452 between grindings. Approximately three-fourths of each of the punch and die surfaces was still available for use.

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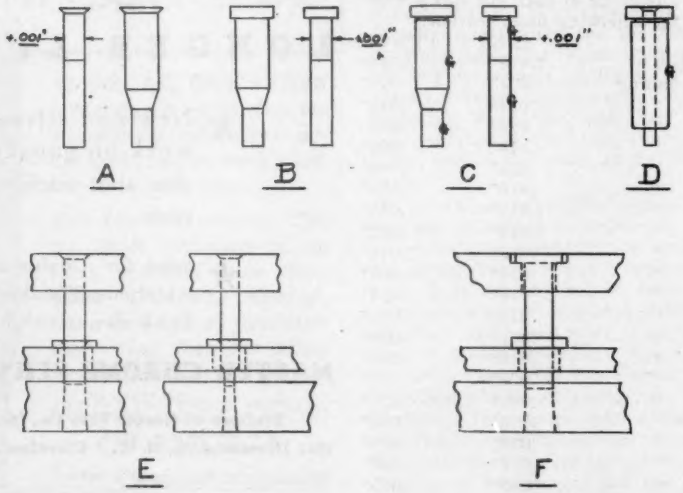
Die Designing and Estimating

(Continued from page 27)

PERFORATORS



PUNCHES OR PERFORATORS

A—PEENED HEAD.

(1)—A standard size drill rod with either a straight, or with turned front that has a riveted or peened head.

(2)—If the size of the hole is standard and large enough to give the perforator enough strength it may be straight. If not, the proper diameter should be turned on the working end.

(3)—A good practice is to maintain a uniform shank, regardless of the size of perforation to be made, so that all of the holes in the punch pad can be made the same size. This is a big time saver.

B—TURNED SHANK AND HEAD.

(1)—The same as the peened except that the entire perforator is machined.

C—GROUND FRONT AND SHANK.

(1)—The same as the turned type except that there is a slight undercut beneath the head to permit easier and more accurate grinding. The entire perforator is first rough machined and then ground after hardening. This makes it very accurate and concentric because if any change has taken place in hardening such change is corrected by grinding.

D—QUILL TYPE.

(1)—This type of perforator is used to pierce very small holes in heavy stock.

(2)—Two parts enter into its construction, the quill or support which is a hardened piece of tool steel with a hole the size of the perforator concentric with the outside diameter, and the perforator, a straight piece of drill rod with a peened head, inserted into the quill.

(3)—The quill type is an excellent type of construction for high production dies which perform the difficult operation of piercing small holes because the perforator has full support. This assures longer life and should the perforator break, its replacement is a matter of minutes.

(4)—The perforator should not extend beyond the quill more than is necessary to do the piercing.

E—STRIPPER GUIDED TYPE.

(1)—This construction is advisable on high production dies where true lineup and easy replacement are necessary.

(2)—A peened head punch is used and is guided into the die opening by either a bushed or hardened stripper.

(3)—If the size of the perforator is

Die Designing and Estimating

(Continued from page 38)

large enough to have the required strength, a straight punch can be used, otherwise the front will have to be turned down to the proper dimension allowing the shank to do the guiding. This is an important phase in this construction for trouble may be experienced by having the punches collapse.

F—FLOATING TYPE.

(1)—This type is also guided by the stripper, the only difference being that the perforators are mounted in the pad in such a way that there is side motion or side play. Such construction allows the punch to find its own center and helps eliminate the continuous rubbing and springing which crystallize the steel, causing frequent breakage.

(2)—Considerable time is saved due to the fact that the very necessary accuracy required in boring or drilling the punch holes in the pad of the stationary types is not needed in this case. The only precaution is to have the holes large enough and in such a location that the perforator will find its own center.

(3)—The turned head type of perforator should be used for this construction in order to obtain the strength necessary to resist the force of pull in stripping.

GENERAL NOTES ON PUNCHES OR PERFORATORS

All perforators must be hardened and drawn to the proper temper needed for the operation, but in all cases the head should be drawn until it is soft or nearly so, in order to prevent chipping or breaking.

There are several firms in the country that have commercial punches and die buttons on the market. These punches are fastened and held in place by a pad and spring ball, or set screw arrangement, which makes them easily removed and replaced. These types have not been discussed here, for only the perforators which are simple and convenient to make in the average shop have been considered.

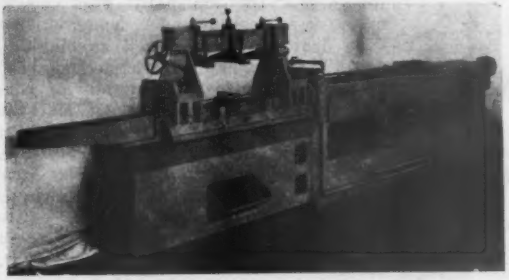
Another installment describing Piercing Dies, their component parts and their proper assembly, will appear in the January issue.

Broaches Bearing Seats of V-8 Engines

THE Universal Broaching Machine with the equipment shown in the accompanying illustration is being used for broaching the bearing seats of the V-8 automobile engine. The fixtures are built up on a separate base and bolted to the face plate of the machine.

The machine, built by Colonial Broach Company, is so designed that the engine cylinder blocks can be slipped into place directly from the roller conveyor on which they travel without requiring additional handling with chain hoists, etc. The blocks are located over dowel pins and are clamped from the end and top.

Broaching is completely automatic, the broach being pulled through the block with a 60-inch travel of the broach heads. The ram has a capacity of 10 tons, about 1/32 in., stock being removed to completely finish the bearing seats to close tolerances.



The machine is equipped with variable speed adjustment and high speed return, providing a production of about 60 blocks per hour including loading and unloading time. Note the extension support for the broach bar on the fixture base.

When you order or write about products described in TDM PROGRESS please mention the publication.

★ ★ ★ ★ ★ ★ ★

IN appreciation for the good will of customers and competitors alike, shown toward us during the year now closing, we extend to all our earnest wish for a New Year of Individual Happiness and Business Prosperity.

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John L. Lyons
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LYONS MACHINE COMPANY

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New Edition of "Contour Machining"

A NEW edition of the handbook on contour sawing with its title changed to "CONTOUR MACHINING — A HANDBOOK" is announced by Continental Machine Specialties, Inc., Minneapolis, Minn.

Much new material has been added to more adequately describe the numerous classes of work which the Doall line of sawing, filing and polishing machines cover. There are tables for the correct machining speeds to be used for sawing or filing 48 different materials ranging from plastic to SAE 1090 and high chrome, high carbon steel. The handbook points out that correct sawing technique eliminates machining strains and results in the attainment of greater accuracy.

Numerous illustrations of actual work in process are shown and substantiated by manufacturers in whose plants the particular job was done. This new handbook may be had without cost by writing directly to the Engineering and Research Department, Continental Machine Specialties, Inc., 1301 Washington Avenue South, Minneapolis, Minn., mentioning Tool·Die·Machine PROGRESS.

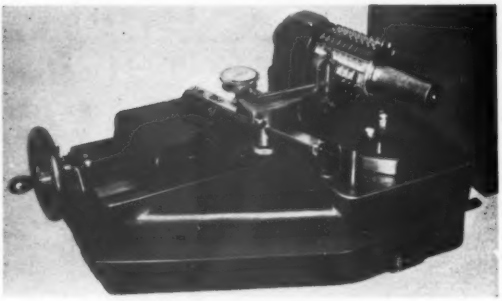
Vitavox Demagnetizer Answers Repeated Demands

THE Vitavox Company, Chicago, Illinois, for many years manufacturers of transformers, has developed a demagnetizer. The original model was built for use in the company's own tool room but the need for such a product brought requests from those who had heard about it. The Vitavox demagnetizer is of the transformer type. It draws 10 amperes of current and is said to be effective on dies measuring as much as 5 inches in thickness. Its unusually high power makes it suitable also for demagnetizing deep drawing dies as well as blanking dies. The Vitavox demagnetizer has been designed to meet the demands of continuous heavy duty operation and the manufacturer gives assurance that it will provide years of satisfactory service.

For descriptive bulletins describing the demagnetizer, as well as the company's magnetic chuck and exciter units, write the Vitavox Company, 430 South Green Street, Chicago, Illinois, for bulletin TD.

When you order or write about products described in TDM PROGRESS please mention the publication.

Improved Checker for Hob Contours



AN improved design hob contour checker which does not require interchangeable angle blocks for checking hobs of different pressure angles is offered by Michigan Tool Company, 7171 E. McNichols, Detroit, Michigan. Instead a sine-bar setting is provided on the instrument which is accurate in showing deviations from true pressure angles of as little as .0001 inch.

The indicator which is provided has a multiplication of five to one. Thus when the contact finger moves .0002 inch the register will indicate a travel normally representing .001 inch. This makes possible the registering of even such depressions and elevations as are caused by rough grinding.

The checker is particularly designed for use on hobs in locating possible sources of gear errors and it is indispensable for gear laboratory and tool room use.

From the illustration it will be noted that the instrument is of attractive design and sturdy construction. A sheet metal cover protects it when not in use.

Development of Grob Filing Machine

(Concluded from page 29)

For instance, a single lever movement only is required to release the tension to the Grob file chain. This lever, as shown in the sketch, is connected with an eccentric moving the upper pulley. The file chain has the same length at all times, whereas a saw blade varies in length. This simple arrangement, therefore, could not be retained if the machine were used as a saw and the file chain could not be inserted for internal filing or exchanged with another as quickly; nor could the machine be built as economically.

The disadvantages to the user who wishes a filing machine only are obvious. He would be paying an extra price for a machine not as well suited for his purpose.

Further advantages of a single purpose machine are that it is always ready to be operated. If the user had a small filing job and the machine was set up for sawing, time would be required to make the change of guiding means, and so forth, and if another man had a sawing job, one or the other would have to wait for the machine. Since two separate machines, each having a single purpose, are built about as cheaply as one machine having two features, the user is obviously ahead in having two machines.

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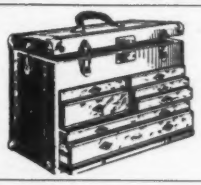

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South Bend Adds 12-Speed Model Lathe to '38 Line

A NEW 12 speed model features the 1938 South Bend line of 9-inch Precision Lathes. With spindle speeds ranging from 40 to 1200 R.P.M. this model is particularly adapted to machining very small diameter parts of steel, cast iron, brass, aluminum, bronze and other metals with precision-accuracy. The 1938 South Bend 9-inch lathe cuts screw threads from 4 to 112 per inch, including 11½" pipe thread and has power longitudinal feeds of .002" to .015" per revolution of the spindle.

Other features incorporated in the new lathe are a simplified twin gear reverse for cutting right and left-hand screw threads; improved back-geared headstock with adjustable and larger spindle bearings and a ball thrust bearing on the ¾" hollow steel spindle; a heavier designed saddle with adjustable gibs on cross feed and compound rest; a precision lead screw guaranteed to meet the most exacting requirements for cutting accurate screw threads on master taps, precision thread gauges, etc.; and, all gear teeth are precision cut from solid steel or semi-steel blanks.

To insure extreme precision-accuracy on all machining operations, the one-piece cast, semi-steel lathe bed has prismatic V-ways, handscraped to provide the finest bearing surface, assuring permanent alignment of headstock, tailstock and carriage. Four bed lengths available.

The different types of the 9-inch Workshops are: 1) New 12 speed lathe; 2) Adjustable Horizontal Motor Driven Bench Lathe; 3) Underneath Belt Motor Driven Bench Lathe; 4) Pedestal Adjustable Motor Driven Floor Leg Lathe; 5) Double Friction Countershaft Driven Lathe; 6) 9"-11" Swing Raising Block Lathe; 7) Tool Room Lathe with draw-in collet chuck, graduated taper attachment, thread dial indicator, micrometer carriage stop and chip pan.

With more than 35 attachments which may be fitted to the South Bend 9-inch Lathe, making a wider range of operation, it becomes a versatile machine tool for use in tool, die and machine shops, general manufacturing plants, experimental laboratories.

For copy of new catalog 46TD write Technical Service Dept., South Bend Lathe Works, South Bend, Ind., mentioning this publication.

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Above: Putnam End Mills being blasted with fine steel shot. At right: The Homo Electric Furnace.

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EVERY step in the manufacture of Putnam Tools reflects up-to-the-minute efficiency. After hardening in salt baths of graduated heats, Putnam Hi-Speed end mills, counterbores, reamers and special tools are tempered in a Homo Electric Furnace in which a correct and constant temperature is always maintained. When removed from the tempering furnace, they are finished in a special blasting chamber with minute particles of steel shot. Methods such as these—in addition to the use of the finest high speed steel and the employment of the most precise workmanship—assure *you* of cutting tools that are unsurpassed in dependable performance.

Our catalog lists complete information and prices on the entire line of Putnam Tools. Write for it . . . TODAY!

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Tungsten

The Aristocrat of Rare Metals

A digest of interesting facts as published in the industry organ of the American Tungsten Association, Charles H. Segerstrom, President.

THE greatest use of tungsten . . . a use that overshadows all others in the quanity of the metal utilized . . . is as a constituent of tool steels and especially of high-speed steels.

For thirty years tungsten has been as staple in high-speed steel as yeast in bread. It is often said that one man with one lathe and tungsten-steel tools can do as much work as five men with five machines and carbon-steel tools.

A prominent automobile manufacturer making a high-priced car said that if he had to use the old carbon tools it would increase the cost $200 per car. If on the 4,000,000 cars manufactured annually in this country a saving of only $50 per car is realized, it would mean an annual saving of $200,000,000.

What is true of automobile building is true of all other shop practice where steel and iron must be turned, planed, drilled or otherwise cut, and savings in such shops must amount to $300,000,000 more on a consumption of tungsten concentrates probably not exceeding 3,500 tons.

No other metal produced in such comparatively small quantity has the industrial importance of tungsten . . . nor has any other metal had such an influence upon the comfort of people at large.

Let us review one interesting contribution of tungsten to modern civilization, the tungsten filament for artificial light. In 1928 it was estimated that to have produced the artificial light used in the United States during the preceding year by the carbon filament lamps (which the tungsten filament lamps superseded) would have necessitated an added expenditure of two billion dollars. In that year nearly five hundred million lamps of all types were sold. In 1934 approximately seven hundred million lamps of all types were sold in this country, so that presumably the saving in 1934 was increased to more than two billion five hundred million dollars.

Tungsten filaments give a quality of light otherwise unattainable. This quality has made it possible to light small isolated buildings, mines, ships, trains and automobiles on a par with lighting systems connected with large central plants. For all these uses, however, not more than one hundred tons of concentrates are used per year.

Tungsten is one of the heaviest of metals, comparing favorably with gold and platinum in density. In the thirteenth century miners in Saxony observed ores of the element and gave them their name, tungsten . . . meaning "heavy stone." About the middle of the eighteenth century it was recognized as a distinct element. The element has never been found free in nature but always occurs in some chemical combination.

The more important minerals which furnish the tungsten of commerce are scheelite, wolframite, ferberite and huebnerite.

In the United States scheelite forms the largest part of the tungsten minerals produced and is the favorite tungsten mineral for metallurgical use.

The principal ferberite field has been that of Boulder, Colorado.

Huebnerite is found only in quartz veins and in the United States has been mined in Arizona, Colorado, Idaho, Nevada and New Mexico.

Wolframite is the commonest tungsten mineral in all producing countries except the Malay States, New Zealand and the United States. In all of the Burmese, Tonkinese, French, English, Portuguese, and most of the Argentinian, Bolivian, Australian and Chinese tungsten deposits the mineral is wolframite.

The tungsten imports into the United States during the first half of the year were exceptionally large and are estimated at 3,290.66 tons valued at $1,606,-074.

In the United States many new producers are appearing; prospects are being developed and old mines reopened because of the high current prices. During this period we will witness a great increase in domestic production beginning after January 1, 1938, when important producers will have completed new milling plants.

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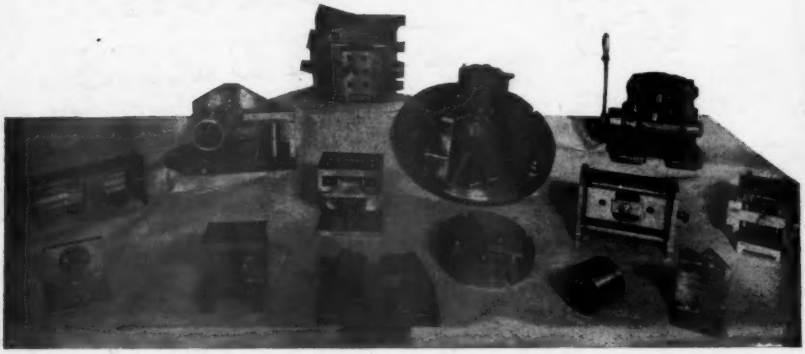

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